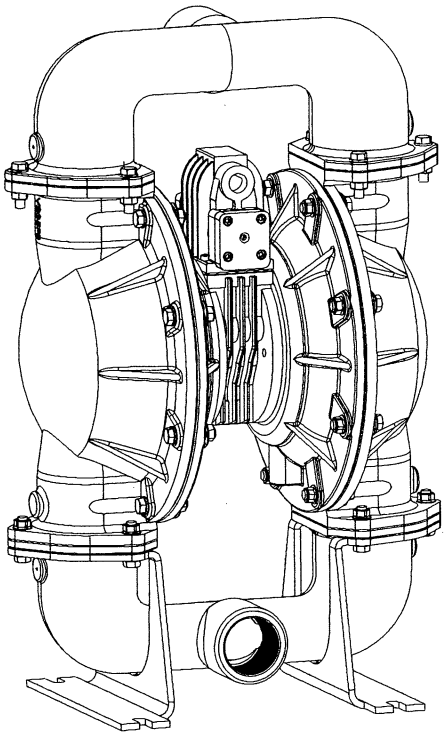
PUMP™

VERSA-MATIC® PUMP

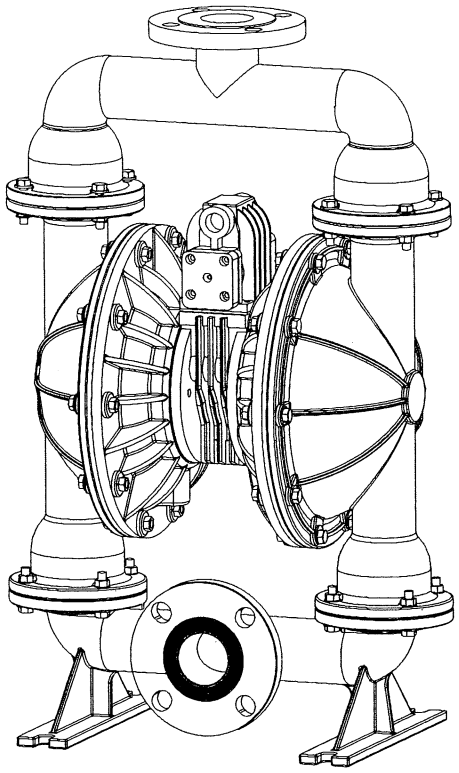
Member of Hydraulic INSTITUTE

OPERATING INSTRUCTIONS

2" Aluminum Bolted Pump



2" Stainless Steel Bolted Pump

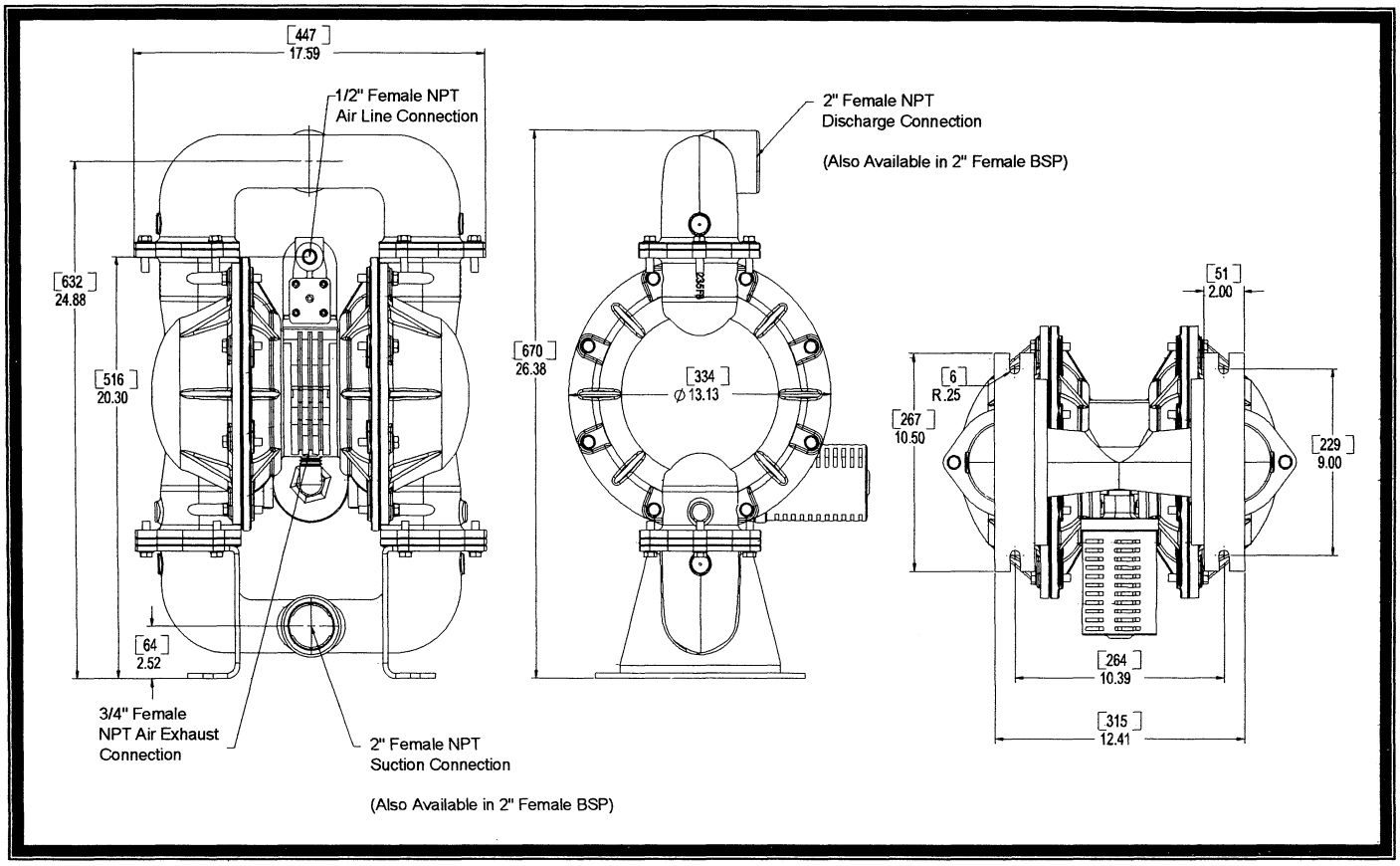


OI-E2B, 3/00 Revised

2" Elima-Matic Bolted Pumps

E2 Aluminum Bolted Pump Specifications

Dimensions



Characteristics

Adjustable Flow Rate
Rugged Diaphragms.....0 to 40 m^3/hr (0-174 gpm)
Dome Diaphragms.....0 to 36 m^3/hr (0-160 gpm)
Teflon Diaphragms.....0 to 30 m^3/hr (0-132 gpm)

Pump Connections
Suction.....2" Female NPT (2" Female BSP)
Discharge.....2" Female NPT (2" Female BSP)
Air Inlet.....½" Female NPT
Air Exhaust.....¾" Female NPT

Suction Lift (Dry)
Rugged Diaphragms.....6.09 m (20 feet)
Dome Diaphragms.....6.09 m (20 feet)
Teflon Diaphragms.....3.04 m (10 feet)

Maximum Particle Size.....11 mm Diameter (7/16" diameter)

Shipping Weight.....33 kg (73.5 lbs)

WARNING

Air Operated Diaphragm Pumps may generate fluid pressures equal to the air supply pressure.

DO NOT exceed the recommended air supply pressure of 862 kPa (125 psi) for 2" metallic bolted pumps!

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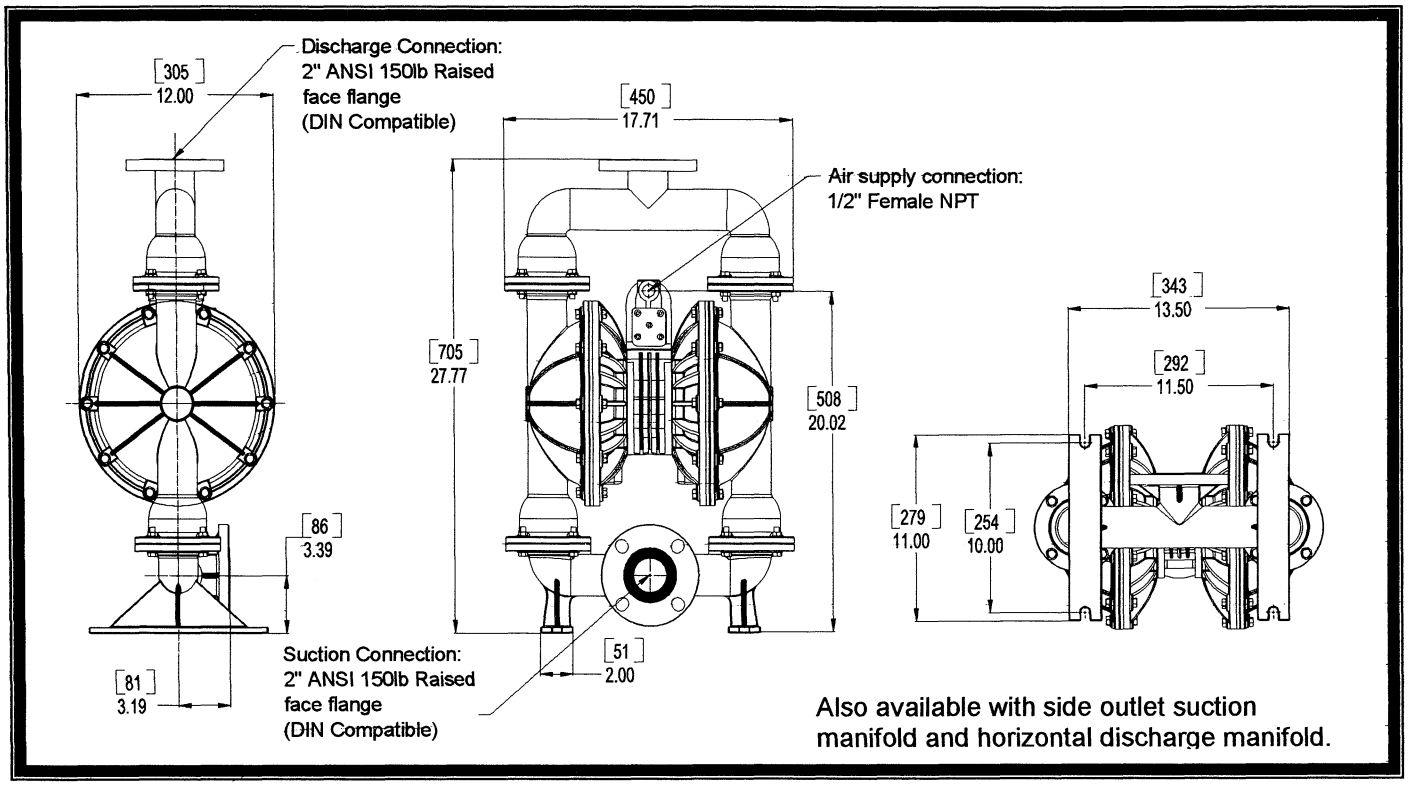
Elima-Matic®, Versa-Tuff™, and Versa-Dome® are trademarks of Versa-Matic Tool, Inc.

E2 Stainless Steel Bolted Pump Specifications

Dimensions



Characteristics

Adjustable Flow Rate
Dome Diaphragms.....37 m^3/hr (0 to 160 gpm)
Teflon Diaphragms.....33 m^3/hr (0 to 132 gpm)

Pump Connections
Suction.....2"- 150 lb. ANSI Flange (DIN Compatible)
Discharge.....2"- 150 lb. ANSI Flange (DIN Compatible)
Air Inlet.....½" Female NPT
Air Exhaust.....¾" Female NPT

Suction Lift (Dry)
Dome Diaphragms.....6.09 m (20 feet)
Teflon Diaphragms.....3.04 m (10 feet)

Maximum Particle Size.....6 mm Diameter (1/4" Diameter)

Shipping Weight.....54 kg (120 lbs.)

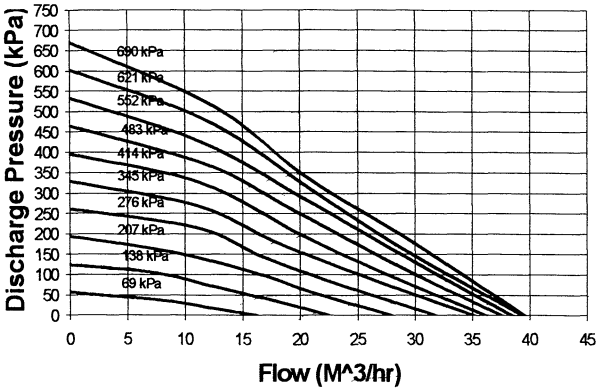
Note:

2" Stainless steel bolted pumps are available with different inlet and discharge configurations.

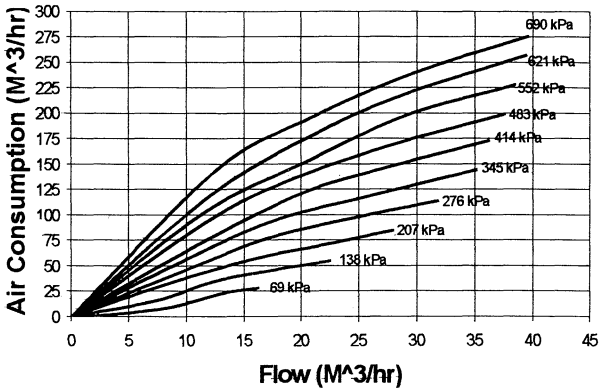
Please consult your sales representative or the factory for certified drawings of the assembly options.

E2 Aluminum Bolted Pump Performance- Metric Units

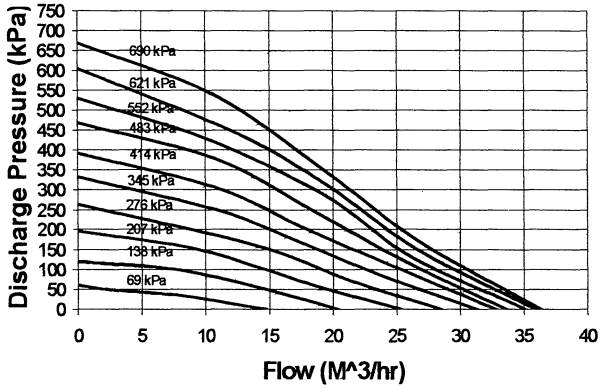
Rugged Diaphragms



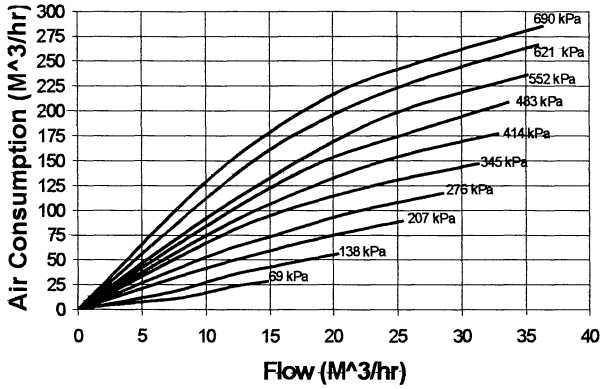
Rugged Diaphragms



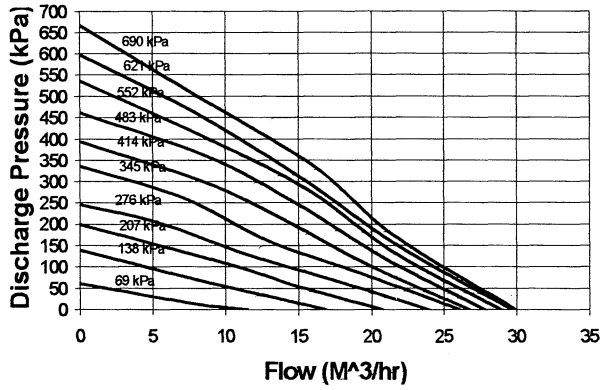
Dome Diaphragms



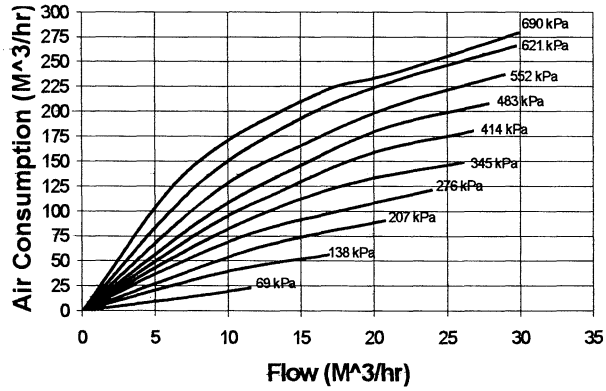
Dome Diaphragms



Teflon Diaphragms



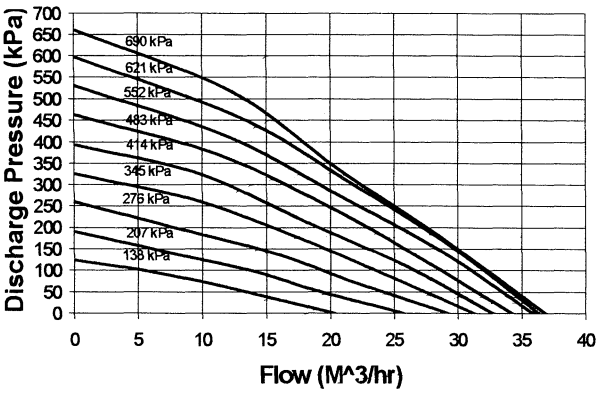
Teflon Diaphragms



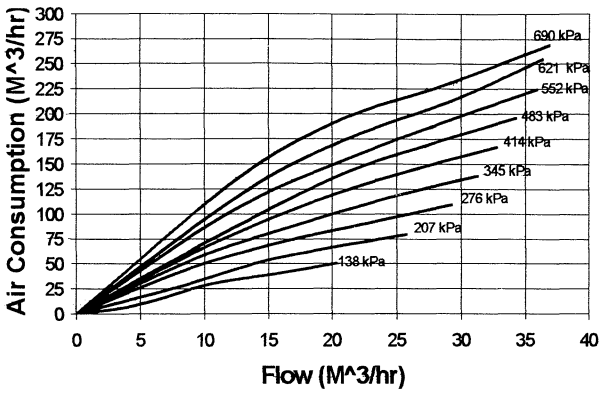
Note: If the discharge pressure is known in meters of water, multiply by 9.8 to get kPa.

E2 Stainless Steel Bolted Pump Performance- Metric units

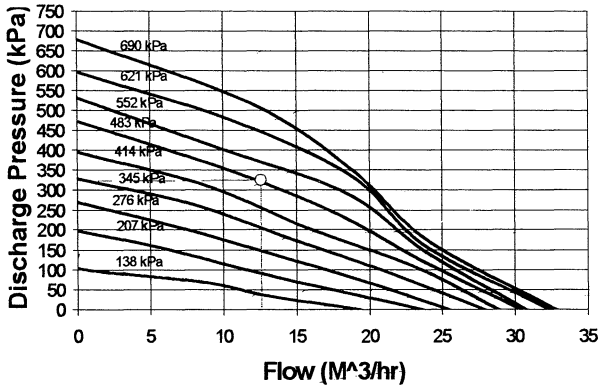
Dome Diaphragms



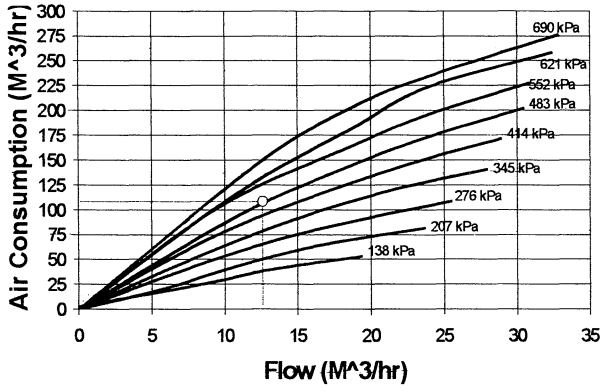
Dome Diaphragms



Teflon Diaphragms



Teflon Diaphragms



Note: If the discharge pressure is known in meters of water, multiply by 9.8 to get kPa.

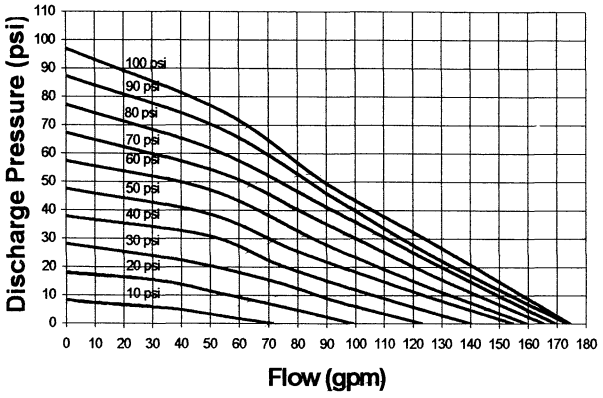
How To Read Pump Performance Curves

To find the air inlet pressure and air volume necessary to operate a pump at a desired flow rate and head pressure you need to first go to the flow chart on the left. Find the desired flow horizontally on the chart and move vertically until you intersect with the system discharge pressure. This point represents the necessary air supply pressure. Next, go to the corresponding chart on the right. Find the desired flow horizontally across the bottom of the chart and move vertically until you cross the necessary air supply pressure. Finally, move horizontally to the left to find the required air supply volume.

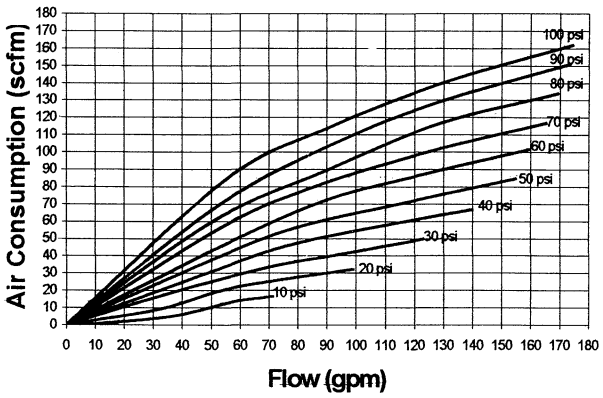
Example: To obtain 12.5 M^3/hr of flow with 320 kPa of discharge pressure with a Teflon fitted stainless steel bolted pump, you will need 483 kPa of air inlet pressure and 107 M^3/hr air consumption.

E2 Aluminum Bolted Pump Performance- English Units

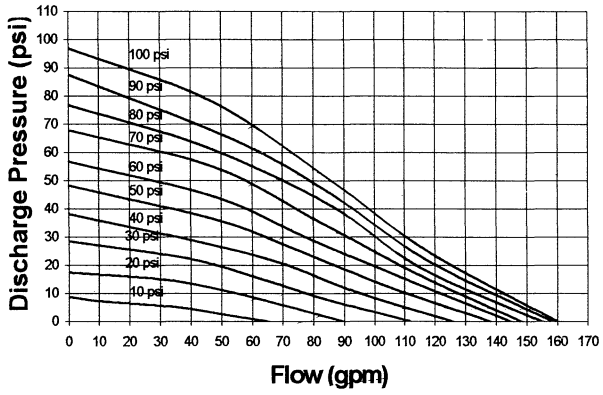
Rugged Diaphragms



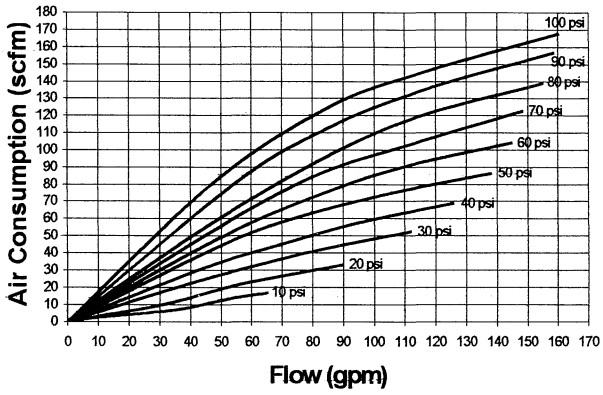
Rugged Diaphragms



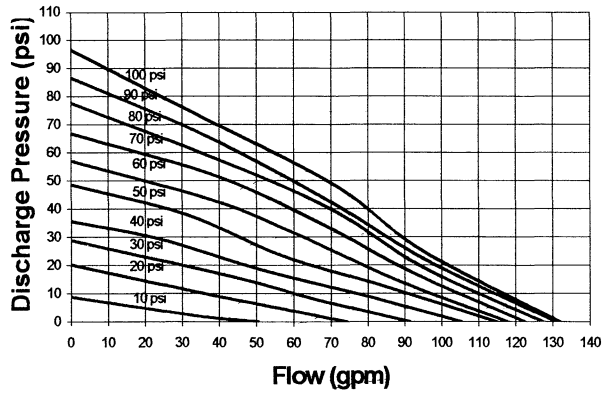
Dome Diaphragms



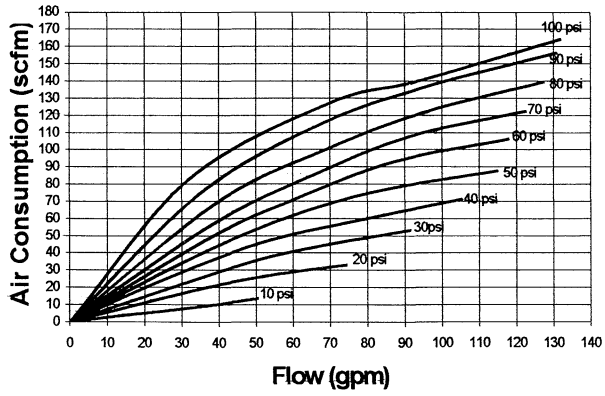
Dome Diaphragms



Teflon Diaphragms



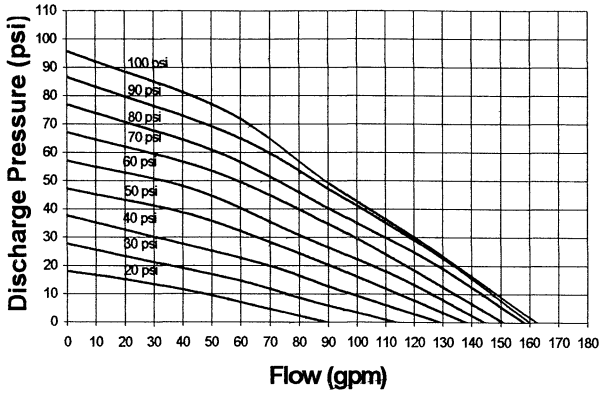
Teflon Diaphragms



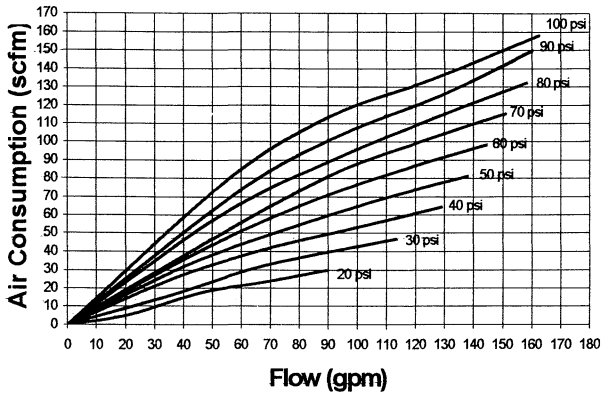
Note: If the discharge pressure is known in feet of water, multiply by 0.43 to get psi.

E2 Stainless Steel Bolted Pump Performance- English units

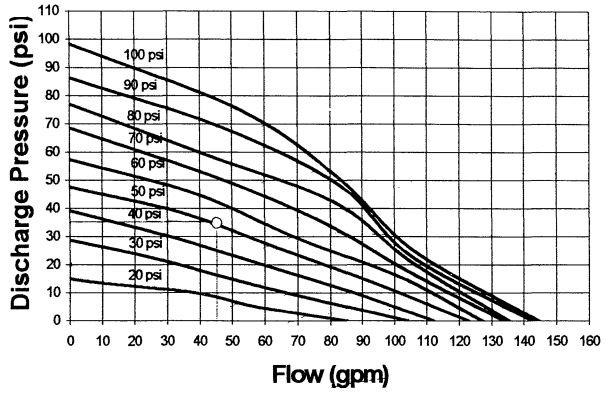
Dome Diaphragms



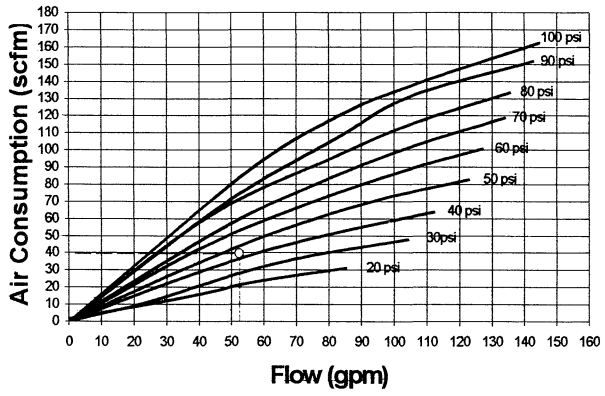
Dome Diaphragms



Teflon Diaphragms



Teflon Diaphragms



Note: If the discharge pressure is known in feet of water, multiply by 0.43 to get psi.

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Example: To obtain 45 gpm of flow with 35 psi of discharge pressure with a Teflon fitted stainless steel bolted pump, you will need 50 psi of air inlet pressure and 38 scfm air consumption.

Installation

The E2 pump comes with a footed base for easy mounting in permanent installations. The pump should be mounted in a vertical position. In permanent installations, the pump should be attached to plant piping using a flexible coupling on both the intake and discharge connections to reduce vibration to the pump and piping. To further reduce vibration, a surge suppresser next to the pump may be used.

Suction pipe size should be at least 2 inches in diameter or even larger if highly viscous fluid is to be pumped. If suction hose is used, it must be of a non-collapsible reinforced type. Discharge piping should be at least 2 inches in diameter. It is critical, especially on the suction side of the pump, that all fittings and connections are airtight or pumping efficiency will be reduced and priming will be difficult.

The air supply line should be at least 1/2 inch in diameter. Make certain the supply line and compressor are capable of supplying the required pressure and volume of air needed to operate the pump at the desired flow rate. The quality of the compressed air source should be considered. Air that is contaminated with moisture and dirt may result in erratic pump performance and increased maintenance cost as well as frequent process " down time" when the pump fails to operate properly.

Pump Operation

The pump is powered by compressed air. Compressed air is directed to the pump air chamber by the main air valve. The compressed air is separated from the fluid by a membrane called a diaphragm. The diaphragm in turn applies pressure on the fluid and forces it out of the pump discharge. While this is occurring, the opposite air chamber is de-pressurized and exhausted to atmosphere and fluid is drawn into the pump suction. The cycle again repeats, thus creating a constant reciprocating action, which maintains flow through the pump. The flow is always in through the bottom suction connection and out through the top discharge connection. Since the air pressure acts directly on the diaphragms, the pressure applied to the fluid roughly approximates the air supply pressure supplied to the main valve.

Troubleshooting

The pump will not run, or runs slowly:

1. Examine the air inlet screen for debris.
2. Check for a sticking air valve. Remove the air valve from the pump and flush with solvent to remove dirt and/or debris. Check the spool and sleeve for nicks and scratches. If the spool is shiny instead of dull black, the spool and sleeve may be worn out and may need to be replaced. Clean all ports and airways and replace worn out gaskets and o-rings.
3. Check pilot shaft and main shaft for scoring and scratches; replace if needed. Replace the pilot shaft and main shaft o-rings if they are worn, flat or torn.

The pump runs, but little or no material flows:

1. Check for pump cavitation, slow the pump speed down to match the thickness of the material being pumped.
2. Look for sticking ball checks. If the material being pumped is not compatible with the ball material, the elastomer may swell. Replace the balls and seats with a compatible elastomer type.
3. Make sure all the suction line fittings and connections are tight.

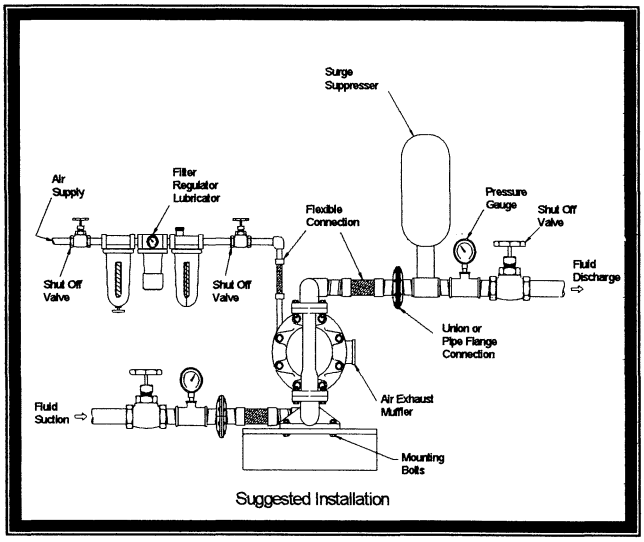
Air bubbles in pump discharge:

1. Look for a ruptured diaphragm.
2. Check for suction leaks in pump manifolds and piping.

Material comes out of the pump air exhaust:

1. Inspect the diaphragm for rupture.
2. Check the tightness of the diaphragm plates to the pump shaft.

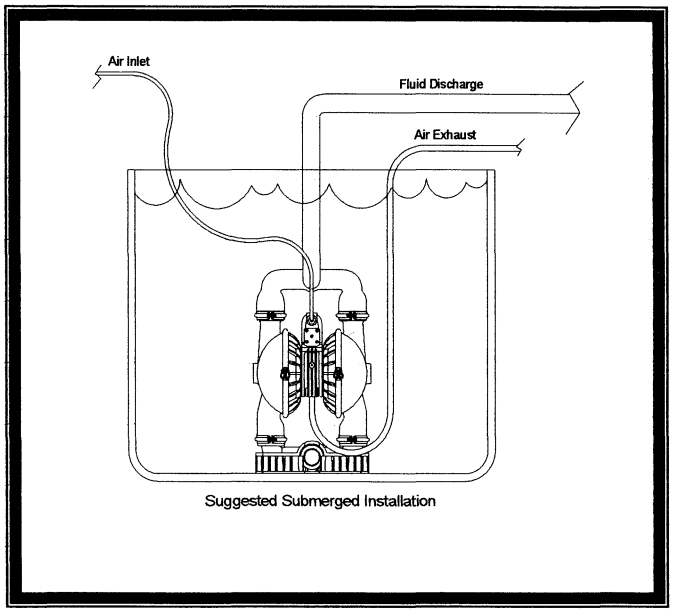
Typical Pump Installations



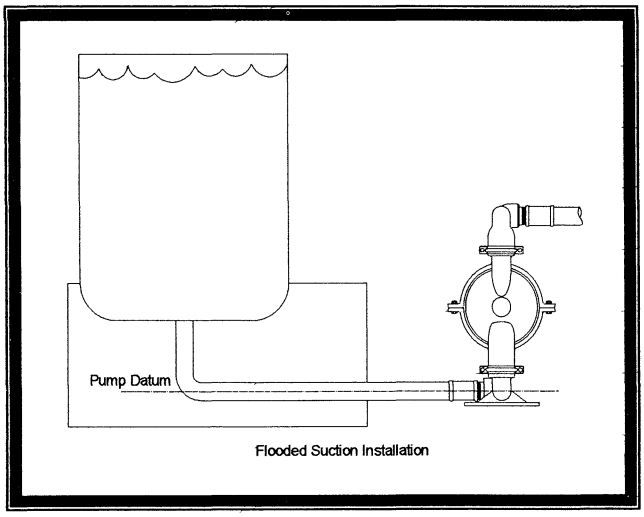
Suggested Installation

◄A typical installation showing all the components that are recommended in a system, including valves, pressure gauges, air regulators, filters, and surge suppressors.

►In a submerged application, the air exhaust port of the pump must be ported above the fluid line. Be certain that the fluid being pumped is compatible with the materials on both the airside and the wetted side of the pump before the pump is submerged.



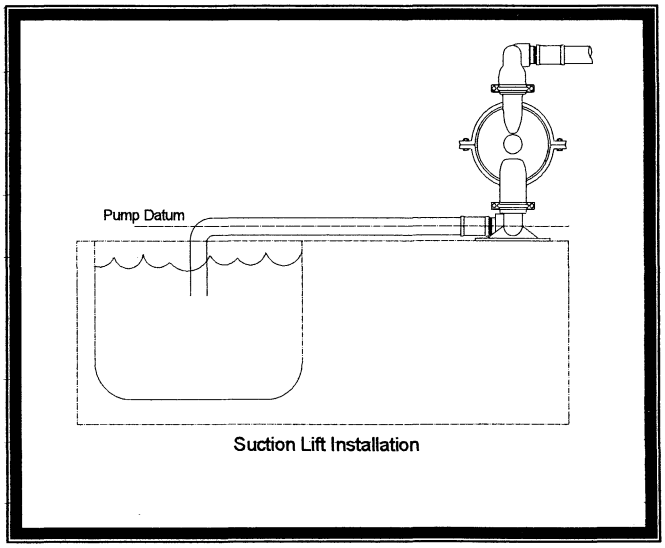
Suggested Submerged Installation



Flooded Suction Installation

◄A flooded suction installation has the pump datum line below the fluid level. IMPORTANT- ın flooded suction installations the pressure at the fluid inlet of the pump should never exceed 69 kPa (10 psi).

►In suction lift installations the pump datum is above the fluid line. IMPORTANT- each pump has different lift capabilities. Be sure to verify the lift capability of a particular pump before installing it into a system.



Suction Lift Installation

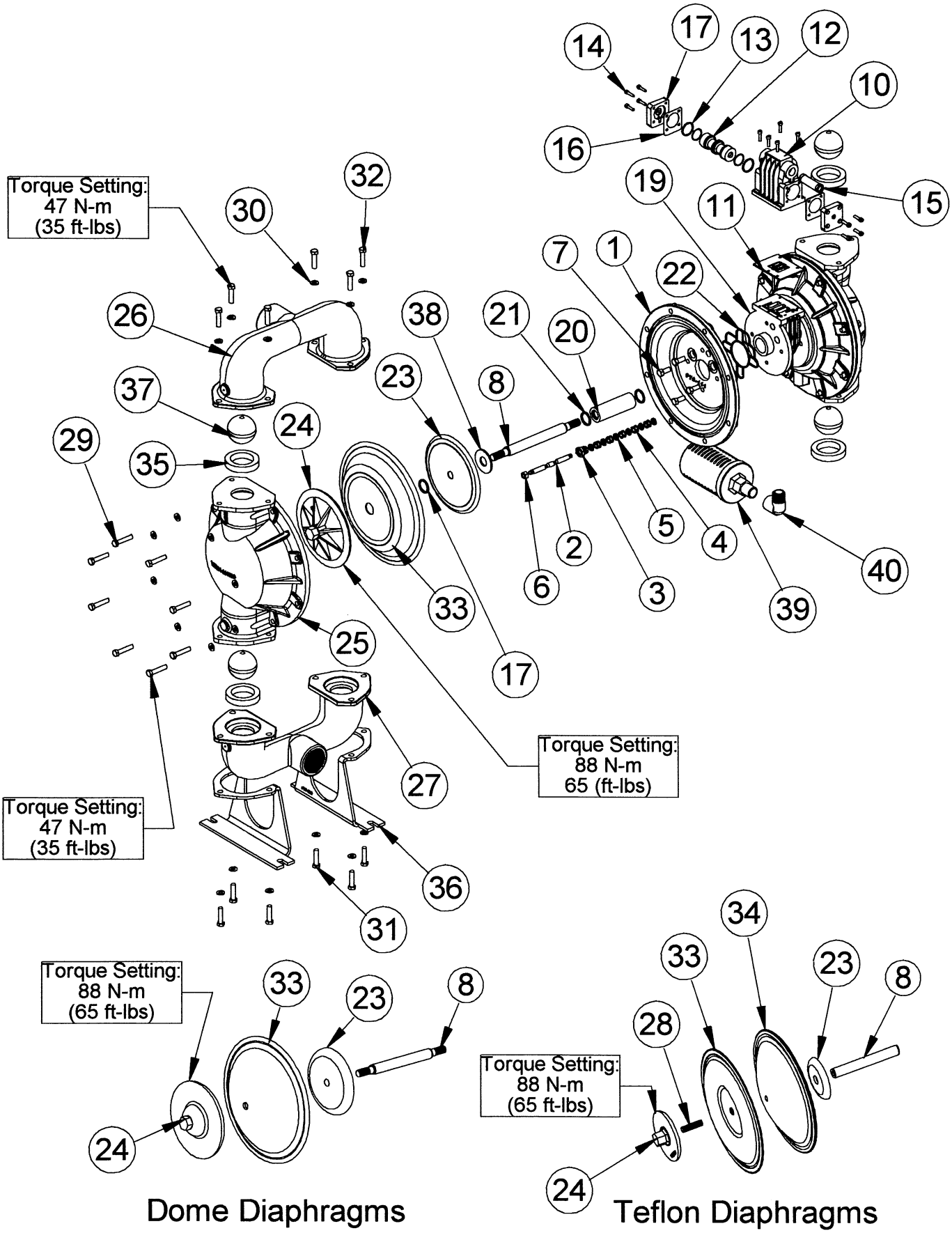
Elima-Matic 2" Aluminum Bolted Pump
Parts List

			PUMP DESCRIPTION		
			2" Aluminum Bolted Pump		
			Rubber and TPE Rugged Elastomers	Rubber and TPE Domed Elastomers	Teflon Elastomers
ITEM	DESCRIPTION	QTY			
1	Air Chamber	2	P79-111		
2	Pilot Shaft	1	P24-104		
3	Bushing, Threaded	2	P24-105		
4	Pilot Valve Spacer Rings	5	P24-106		
5	Pilot Valve O-Rings	6	P24-107		
6	Stop Nut	2	P24-108		
7	Bolt	8	P24-110		
8	Main Shaft	1	P24-103	P24-103	P24-102
9	Valve Assembly (Items 10-17)	1	P34-200		
10	Air Valve & Sleeve Assembly	1	P34-211		
11	Gasket, Valve Body	1	P24-202		
12	Spool, Air Supply	1	P34-204		
13	Glyd-Rings Assembly	2	P34-204F		
14	Cap Screw	13	P24-208		
15	Air Valve Screen	1	P24-210		
16	Gasket, End Cap	2	P24-205		
17	End Cap Assembly	2	P34-300		
18	Center Block Assembly (Items 19-22)	1	P24-400		
19	Center Block	1	P24-401		
20	Bearing Sleeve	1	P24-402		
21	Center Block 0-Ring	2	P24-403		
22	Center Block Gasket	2	P79-109		
23	Inner Diaphragm Plate	2	V221B	V226B	V221TI
24	Outer Diaphragm Plate	2	VB221	VB226	V221TO
25	Water Chamber	2	V235FB		
26	Discharge Manifold	1	V236FB[4]		
27	Suction Manifold	1	V237FB[4]		
28	Shaft Stud	2	N/R	N/R	V221F
29	Bolt- Water Chamber	16	P34-110		
30	Washer	28	V302GA		
31	Bolt- Inlet Manifold	6	P34-110		
32	Bolt- Discharge Manifold	6	P24-110		
33	Diaphragm	2	V224BN V224N V224ND V224VT V224TPEXL V224TPEFG	V225BN V225N V225ND V225VT V225TPEXL V225TPEFG	V224TF-FB V224TX[1]
34	Back-Up Diaphragm	2	N/R	N/R	V224TFB[2] V224TFB-1[3]
35	Valve Seat	4	V240BN V240N V240ND	V240VT V240TPEXL V240TPEFG	V240TF
36	Mounting Bracket	2	P79-390[5]		
37	Valve Ball	4	V241BN V241N V241ND	V241VT V241TPEXL V241TPEFG	V241TF
38	Bumper Washer	2	P24-501	P24-501	N/R
39	Muffler	1	VM-0750		
40	Plastic Elbow	1	PV220G		

1 TX denotes the Versa-Tuff™ Bonded Teflon diaphragm.
2 V224TFB is the Hytrel Back-up Diaphragm used with part number V224TF.
3 V224TFB-1 is the Neoprene Back-up diaphragm used with part number V224TF.
4 Add "BSP" for BSP threads.
5 SP79-390- 304 Stainless steel.

Material Suffix Codes	
BN- Buna-N (Nitrile)	TF- Teflon
N- Neoprene	TPEXL- Thermoplastic XL
ND- Nordel (EPDM)	TPEFG- Thermoplastic Hytrel (Food Grade)
VT- Viton	

2" Aluminum Bolted Pump
Exploded View



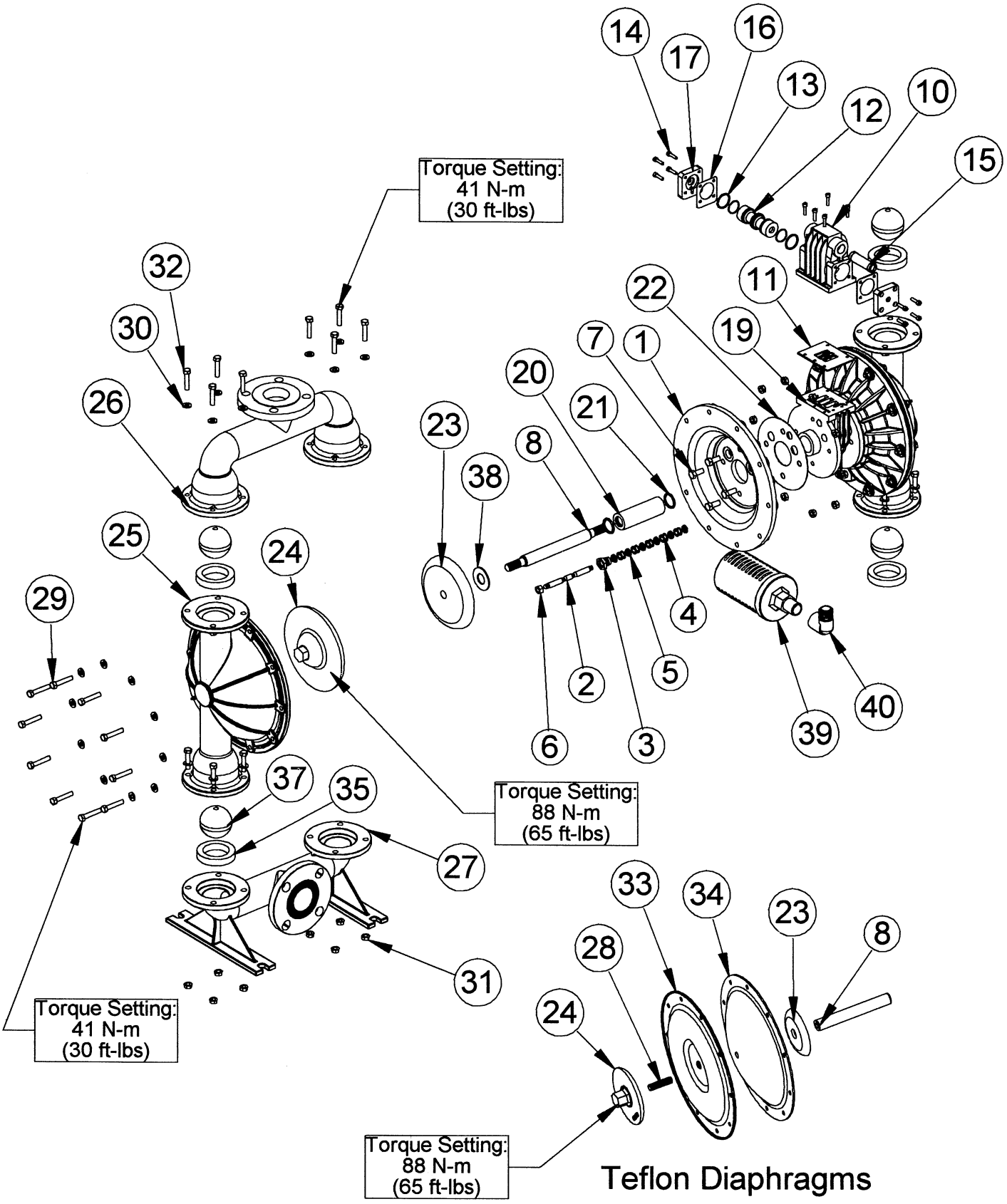
Elima-Matic 2" Stainless Steel Bolted Pump
Parts List

ITEM	Description	QTY	PUMP DESCRIPTION 2" Stainless Steel Bolted Pump Rubber and TPE Elastomers	Teflon Elastomers
1	Air Chamber	2	P24-111	
2	Pilot Shaft	1	P24-104	
3	Bushing, Threaded	2	P24-105	
4	Pilot Valve Spacer Rings	5	P24-106	
5	Pilot Valve O-Rings	6	P24-107	
6	Stop Nut	2	P24-108	
7	Bolt	8	P24-110	
8	Main Shaft	1	P24-103	P24-102
9	Valve Assembly (Items 10-17)	1	P34-200	
10	Air Valve & Sleeve Assembly	1	P34-211	
11	Gasket, Valve Body	1	P24-202	
12	Spool, Air Supply	1	P34-204	
13	Glyd-Rings Assembly	2	P34-204F	
14	Cap Screw	13	P24-208	
15	Air Valve Screen	1	P24-210	
16	Gasket, End Cap	2	P24-205	
17	End Cap Assembly	2	P34-300	
18	Center Block Assembly (Items 19-22)	1	P24-400	
19	Center Block	1	P24-401	
20	Bearing Sleeve	1	P24-402	
21	Center Block 0-Ring	2	P24-403	
22	Center Block Gasket	2	P24-109	
23	Inner Diaphragm Plate	2	V226B	V221TI
24	Outer Diaphragm Plate	2	SVB226	SV221TO
25	Water Chamber	2	SV235FB (stainless steel) WV235FB (cast iron)	
26	Discharge Manifold-Vertical Outlet	1	SV236FB (stainless steel) WV236FB (cast iron)	
26-A	Discharge Manifold-Horizontal Outlet	1	SV236FBH (stainless steel) WV236FBH (cast iron)	
27	Suction Manifold	1	SV237FBH (stainless steel) WV237FBH (cast iron)	
28	Shaft Stud	2	N/R	V221F
29	Bolt-Water Chamber	20	SV187A	
30	Washer	36	SV189C	
31	Nut	36	SV185B	
32	Bolt-Manifold	16	SV189D	
33	Diaphragm	2	V227BN V227N V227ND V227VT V227TPEXL V227TPEFG	V227TF V227TX[1]
34	Back-Up Diaphragm	2	N/R	V227TFB[2]
35	Valve Seat	4	V240BN V240N V240ND V240VT V240TPEXL V240TPEFG	SV240
36	Valve Seat O-Ring	4	N/R	V240T
37	Valve Ball	4	V241BN V241N V241ND V241VT V241TPEXL V241TPEFG	V241TF
38	Bumper Washer	2	P24-501	N/R
39	Muffler	1	VM-0750	
40	Plastic Elbow	1	PV220G	

1 TX Denotes the Versa-Tuff™ Bonded Teflon Diaphragm.
2 V227TFB is the Neoprene Back-up Diaphragm used with Part Number V227TF.

Elastomer suffix codes	
BN- Buna-N (Nitrile)	TF- Teflon
N- neoprene	TPEXL- Thermoplastic XL
ND- Nordel (EPDM)	TPEFG- Thermoplastic Hytrel (Food Grade)
VT- Viton	

2" Stainless Steel Bolted Pump
Exploded View



Safety Warnings

This equipment should only be maintained by experienced professional technicians. Observe all safety warnings. Read all safety warnings and operating manuals before using or repairing this Air Operated Diaphragm Pump.

Any misuse of this equipment such as over-pressurization, modifying parts, pumping incompatible fluids, using worn or damaged parts, or using gasses other than compressed air to power the pump is not recommended. Any of these circumstances could result in splashing or spraying into the eyes or on skin, possible serious bodily injury, fire, explosion, or property damage.

General Safety

ALWAYS wear safety glasses when using power tools to repair this equipment.

Wear proper ear protection when working or standing near A.O.D. pumps. It is recommended that an air exhaust muffler be used on this equipment at all times.

When the pumping system contains dangerous fluids, wear protective gloves, glasses, etc. when working on or around this equipment.

Always shut off the air supply and disconnect it from the pump before performing maintenance or repair on the pump.

Do NOT put your face or body near the pump air exhaust while the pump is operating.

Bleed all pressure from the discharge and suction lines before disconnecting the fluid suction or fluid discharge lines from the pump.

Before starting a pump, make certain that the discharge point of the piping system is clear and safe and all persons have been warned to stand clear.

Always make sure that safety shut off valves, regulators, pressure relief valves, gauges, etc. are working properly before starting the pump.

Equipment Misuse Hazard

Do NOT operate a pump that is leaking, damaged, corroded, or otherwise unable to contain the internal fluid pressure.

Do NOT pump incompatible fluids through the pump. Consult your distributor or the factory if you are not sure of the compatibility of fluids with the castings and elastomers.

Never exceed the operating pressure recommended for the pump: 862 kPa (125 psi).

Do NOT submerge the pump in liquids that are incompatible with the wetted or non-wetted parts of the pump. If installing in a submerged location, extend the air exhaust port above the liquid surface with suitable pipe or hose. Route the exhaust line to a safe location away from people and install an air exhaust muffler.

A.O.D. pumps utilize an elastomeric membrane to separate the pumping liquid from the air supply. When this membrane ruptures, pumping fluid may be expelled from the air exhaust port. Always pipe the air exhaust port to a safe location or suitable container if dangerous or volatile liquids are being pumped.

Never allow the piping system to be supported by the pump manifolds or valve housing. The manifolds and valve housings are not designed to support any structural weight and failure of the pump may result. The use of flexible piping connections is highly recommended.

Do NOT exceed the recommended operating temperatures of the pump or pump failure may result.

Temperature Limitations

Maximum temperature limitations are based on mechanical stress only. Certain chemicals will reduce the maximum safe operating temperature of A.O.D. pumps. Consult your dealer or Chemical Resistance Guide for compatibility and temperature limits.

Metallic Pumps can operate past 100°C (212°F). However, if you are operating above these limits, consult the factory for assistance.

Do NOT exceed the maximum temperature limits of the elastomer type (diaphragms, balls, seats) that are used in the pump.

Temperature Limits of Various Elastomer Types:
Neoprene: -18°C (0°F) to 93°C (200°F)
Buna-N: -12°C (10°F) to 82°C (180°F)
Nordel: -51°C (-60°F) to 138°C (280°F)
Viton: -40°C (-40°F) to 176°C (350°F)
Teflon: 4°C (40°F) to 105°C (220°F)
Polyurethane: -12°C (10°F) to 77°C (170°F)
XL TPE: -29°C (-20°F) to 149°C (300°F)
FDA Hytrel: -29°C (-20°F) to 104°C (220°F)

Sound Level Ratings

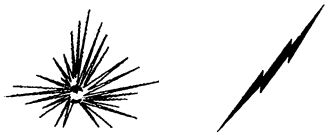
2" Elima-Matic pumps (Model E2) have a decibel reading of **70 dB(A)** when equipped with a factory installed air exhaust muffler.

The decibel readings are obtained with a Pacer Industries model SL-120, sound level indicator "A" scale. Readings are made at a distance of 1 meter from the pump and at a height of 1.6 meters above the floor. It is assumed that the pumps will be installed at floor level.

Moving Parts Hazard

The diaphragm plates (sometimes referred to as piston plates) located inside the pump on either side of the main shaft move when air pressure is supplied to the pump. Therefore, never attempt to operate the pump with the liquid chambers removed. Moving parts inside the pump can pinch or seriously injure fingers or other body parts.

Fire or Explosion Hazard

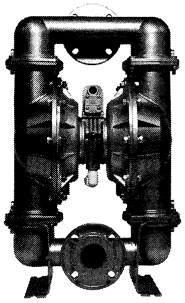


Static electricity can be created by the flow of fluid through the pump or by the reciprocating action of A.O.D. pumps. If the pump is not properly grounded, sparking may occur and the system may become hazardous. Sparks can ignite fumes or vapor and cause an explosion.

If you experience static sparking or even a slight shock while using the pump, do not continue to operate the pump until the pump is properly grounded.

Proper Grounding

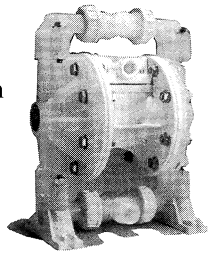
To ground metallic pumps, connect a ground wire to any accessible point of attachment such as a connecting bolt or the mounting base.



ELIMA-MATIC® ANTI-STALLING PUMPS

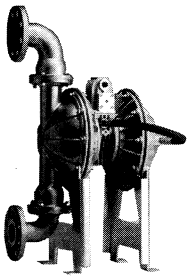
- ❒ Virtually eliminates pump stalling caused by air valve system freeze-ups
- ❒ Anti-stalling, non-icing, lubrication-free air valve system.
- ❒ Available in 1/2", 1", 1 1/4", 2" and 3" sizes
- ❒ Wide selection of materials of construction—including 1/2", 1" and 2" plastic models

PLASTIC PUMPS FOR SOLVENTS AND CHEMICALS



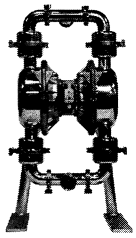
- ❒ Exceptional corrosion resistance
- ❒ Wide selection of materials of construction for wetted and non-wetted parts
- ❒ Leak free bolted construction
- ❒ Also available in 1/2", 1" and 2" with the Elima-Matic anti-stalling air valve system

Elima-Matic 2:1 High Pressure Pump



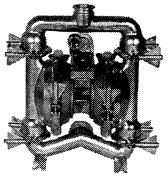
- ❒ Cast in 150lbs ANSI/DIN flanges
- ❒ Constructed of 316 stainless steel
- ❒ Can create discharge pressure over 200 psi
- ❒ Leak-Free bolted design

FOOD AND SANITARY PUMPS



SANITARY PUMPS

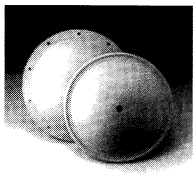
- ❒ FDA approved for use milk and milk products
- ❒ Constructed of 316 stainless steel
- ❒ Surface finish of 32 micro-inch or better
- ❒ Removable ball cages
- ❒ Easy clean Tri-clamp® connections



FOOD PROCESSING PUMPS

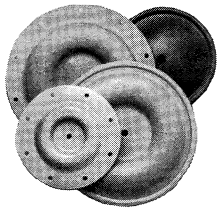
- ❒ Constructed of 316 stainless steel
- ❒ FDA approved
- ❒ Tri-clamp® connections
- ❒ Over-sized clamp wing nuts for disassembly

VERSA-DOME® DIAPHRAGMS



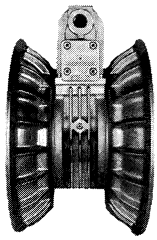
- ❒ The simple, smooth design eliminates complex angles allowing for 3 to 4 times the flex life of standard diaphragms.
- ❒ So flexible they can be installed and removed without the use of pry bars
- ❒ Has lower start up pressure than standard diaphragm.
- ❒ Available Neoprene, Buna-N, Hytrel, Nordel®, Viton® and XL.
- ❒ For use in Versa-Matic and Wilden 1/2", 2", 3" pumps.

VERSA-TUFF TEFLON DIAPHRAGMS



- ❒ Single piece diaphragm combining the chemical resistance of Teflon with the flex life of rubber.*
- ❒ Three times the burst strength of ordinary Teflon overlays
- ❒ More flexible and 100% bonded to the reinforced rubber backing
- ❒ Diaphragms can be placed into Wilden® M4 and M8 pumps

GENUINE VERSA-MATIC REPLACEMENT PARTS AND RETRO FIT CENTER SECTIONS



- ❒ Upgrade V-series and Wilden® M4, M8, and M15 pumps with an Elima-Matic retro fit center section
- ❒ For complete repair of Versa-Matic pumps and Wilden® M4, M8 and M15 metallic pumps
- ❒ Cost-saving elastomer kits for any Versa-Matic pump or Wilden® M1, M2, M4, M8 and M15 pumps
- ❒ Diaphragm and elastomer repair kits available in Buna-N, Neoprene, Nordel®, Teflon®, Viton®, Thermo Plastics Hytrel®, and XL

Your local authorized distributor:

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www.versamatic.com

VM PUMP™ VERSA-MATIC® PUMP

VERSA-MATIC PUMP ISO 9001 CERTIFIED QUALITY

• Life cycle may vary according to extreme start-up conditions, chemicals and abrasive fluids. To prolong diaphragm life, Versa-Matic recommends a gradual increase in air supply on pump start-up.

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